OCCUPATIONAL ANALYSES SERIES

Plumber

2003

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Occupational Analyses Series
Plumber

2003

Policy and Apprenticeship Division
Human Resources
Partnerships Directorate

Division des politiques et
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The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this occupational analysis as the national standard for the occupation of Plumber.

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OTHER RELATED OCCUPATIONAL TITLES

This analysis covers tasks performed by a Plumber whose occupational title has been identified by some provinces and territories of Canada under the following names:

- Plumbing
- Plumbing and Domestic Heating
- Pipefitter – Plumber Specialty

LIST OF PUBLISHED OCCUPATIONAL ANALYSES[1]

TITLE	NOC** Code
Appliance Service Technician (1997)	7332
Aquaculture Technician (1977)	2221
Arts Administrator (1989)	0114
Automotive Painter (1995)	7322
Automotive Service Technician (1998)	7321
Automotive Technician - Automatic Transmission (1990)	7321
Automotive Technician - Electrical/Electronics (1992)	7321
Automotive Technician - Engine Repair and Fuel Systems (1989)	7321
Automotive Technician - Front-End (1989)	7321
Automotive Technician - Manual Transmission, Driveline and Brakes (1990)	7321
Aviation Machinist (1994)	7231
Baker (1997)	6252
Blaster (Surface) (1987)	7372
Boilermaker (2003)	7262
Bricklayer (2000)	7281
Cabinetmaker (2000)	7272
Carpenter (1998)	7271
Cement Finisher (1995)	7282
Construction Electrician (2003)	7241
Cook (2003)	6242
Electrical Rewind Mechanic (1999)	7333
Electronics Technician – Consumer Products (1997)	2242
Electronics Technician Vol. I (1986) (Video Equipment)	2242
Electronics Technician Vol. II (1986) (Audio Equipment)	2242
Electronics Technician Vol. III (1986) (Computer Equipment)	2242
Electronics Technician Vol. IV (1986) (Office Equipment)	2242

[1] **Red Seal analyses are indicated in bold**
National Occupational Classification

Electronics Technician Vol. VI (1986) (Communication Equipment)	2242
Electronics Technician Vol. VII (1986) (Signaling Equipment)	2242
Electronics Technician Vol. VIII (1986) (Navigation Equipment)	2242
Electronics Technician Vol. IX (1986) (Video Game Equipment)	2242
Electronics Technician Vol. X (1987) (CADD Equipment)	2242
Electronics Technician Vol. XI (1987) (CAM Equipment)	2242
Electronics Technician Vol. XII (1987) (Robotics Equipment)	2242
Electronics Technician Vol. XIII (1987) (Biomedical and Laboratory Equipment)	2242
Electronics Technician Vol. XIV (1987) (Industrial Process-Control Equipment)	2243
Farm Equipment Mechanic (2000)	7312
Floorcovering Installer (1997)	7295
Glazier (1994)	7292
Hairstylist (1997)	6271
Heating (Gas and Oil) Servicer - Commercial and Industrial (1978)	7331
Heavy Duty Equipment Mechanic (1998)	7312
Industrial Electrician (2003)	7242
Industrial Instrument Mechanic (2000)	2243
Industrial Mechanic (Millwright) (1999)	7311
Insulator (Heat and Frost) (2000)	7293
Ironworker (Generalist) (1993)	7264
Lather (Interior Systems Mechanic) (2002)	7284
Logistics (1992)	0713
Machinist (1998)	7231
Major Electrical Appliance Repairer (1984)	7332
Metal Fabricator (Fitter) (2003)	7263
Mobile Crane Operator (1997)	7371
Motorcycle Mechanic (1995)	7334

Motor Vehicle Body Repairer (Metal and Paint) (1997)	7322
New Home Builder and Residential Renovation Contractor (1992)	0712
Oil Burner Mechanic (1997)	7331
Painter and Decorator (2000)	7294
Partsperson (1995)	1472
Plumber (2003)	7251
Power Engineer (1997)	7351
Powerline Technician (1996)	7244
Recreation Vehicle Mechanic (2000)	7383
Refrigeration and Air Conditioning Mechanic (1997)	7313
Roofer (1997)	7291
Sheet Metal Worker (1997)	7261
Sprinkler System Installer (2003)	7252
Steamfitter-Pipefitter (1996)	7252
Tool and Die Maker (1997)	7232
Transport Trailer Technician (2003)	7321
Truck and Transport Mechanic (2000)	7321
Welder (1996)	7265

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FOREWORD

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to co-operate with provincial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources Development Canada sponsors a program, under the guidance of the Canadian Council of Directors of Apprenticeship (CCDA), to develop a series of occupational analyses.

The Occupational Analysis Program has the following objectives:

- to identify and group the tasks performed by skilled workers in particular occupations;

- to identify those tasks that are performed by skilled workers in every province and territory;

- to develop instruments for use in the preparation of interprovincial standards "Red Seal" examinations and curricula for training leading to the certification of skilled workers;

- to facilitate the mobility, in Canada, of trainees and skilled workers;

- to supply employers and employees, and their associations, industries, training institutions and governments with analyses of the tasks performed in particular occupations.

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GUIDE TO ANALYSIS

DEVELOPMENT OF ANALYSIS

A draft analysis is developed by a knowledgeable consultant who, with the assistance of a committee of industry experts in the field, identifies all the tasks performed in the occupation.

The draft is then assigned to occupational analysts at Human Resources Development Canada for translation and then returned to the consultant for review to ensure conformity with the nationally approved format.

The consultant will then forward a copy of this analysis to provincial and territorial authorities for validation by specialists in the field. Their recommendations are assessed and incorporated into the final draft which also includes the identification of the common core tasks performed in the occupation.

The occupational analysis is published in both official languages.

STRUCTURE OF ANALYSIS

To facilitate the understanding of the nature of the occupation, the work performed is divided into the following divisions:

A. **BLOCK** – is the largest division within the analysis and reflects a distinct operation relevant to the occupation.

B. **TASK** – is the distinct activity that, combined with others, makes up the logical and necessary steps the worker is required to perform to complete a specific assignment within a "BLOCK".

C. **SUB-TASK** – is the smallest division into which it is practical to subdivide any work activity and, combined with others, fully describes all duties constituting a "TASK".

Supporting Knowledge & Abilities

The element of skill and knowledge that an individual must acquire to adequately perform the task is identified under this heading.

Trends

Any shifts or changes in technology that affect the block are identified under this heading.

Related Components

All components of a specified task being undertaken by the plumber are identified under this heading.

Tools and Equipment

All tools and equipment necessary for the plumber to complete a task are identified under this heading.

VALIDATION METHOD

At the request of the Canadian Council of Directors of Apprenticeship (CCDA), the Standardization Sub-committee developed a method for the validation of the national Red Seal occupational analyses.

A draft of the analysis is sent to all provinces and territories for validation. Each jurisdiction rates the sub-tasks and applies percentage ratings to blocks and tasks. This method for the validation of the national occupational analysis identifies common core tasks across Canada for a specific occupation. This feature facilitates the weighting of the interprovincial Red Seal examinations.

DEFINITIONS

YES: the sub-task is performed by workers in the occupation in a specific jurisdiction.

NO: the sub-task is not performed by workers in the occupation in a specific jurisdiction.

BLOCK %: the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, which will be placed on an interprovincial examination to assess each block of the analysis.

TASK %: the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, which will be placed on an interprovincial examination to assess each task of the analysis.

NV: Not Validated by a province or a territory.

ND: Not Designated in that province or that territory.

PROVINCIAL AND TERRITORIAL ABBREVIATIONS

NL:	Newfoundland and Labrador
NS:	Nova Scotia
PE:	Prince Edward Island
NB:	New Brunswick
QC:	Quebec
ON:	Ontario
MB:	Manitoba
SK:	Saskatchewan
AB:	Alberta
BC:	British Columbia
NT:	Northwest Territories
YK:	Yukon
NU:	Nunavut

COMMON CORE

The criteria for determining common core depend on the performance of sub-tasks. If 70 percent of the responding jurisdictions (excluding NVs and NDs) perform a sub-task, it shall be considered common core.

Interprovincial Red Seal examinations are based on the common core identified through this validation process. This process identifies what will be assessed through the interprovincial examination.

BLOCKS AND TASKS WEIGHTING (APPENDIX "C")

This appendix represents the block and task percentages as submitted by each jurisdiction.

Each jurisdiction, with the use of a provincial and a territorial occupational advisory committee, validates the content, places percentages on blocks and tasks, and indicates whether or not the sub-tasks are performed by the skilled workers within the occupation. The results of this exercise are submitted to the consultant who then analyzes the data and develops this appendix which provides the individual jurisdictional validation results as well as the national averages of all responses.

PIE CHART (APPENDIX "D")

The graph depicts the national percentages assigned to blocks in the analysis.

SCOPE OF THE PLUMBER OCCUPATION

The occupational title "Plumber" defines persons having the knowledge, training and abilities to install, repair and maintain a variety of piping systems, plumbing fixtures and other equipment generally associated with, but not limited to, water distribution and wastewater disposal.

People in this occupational group are employed by maintenance departments of manufacturing, commercial, health care and educational facilities, by plumbing contractors, by plumbing service companies or they may be self-employed. They may specialize in the installation of piping systems in a wide variety of settings, such as residential, commercial, industrial and public buildings, as well as in the repair and maintenance of existing systems.

In the accomplishment of their job functions, plumbers may perform all or some of the following duties: installation of drainage, waste, vent piping and private sewage disposal systems, installation of water distribution systems, plumbing fixtures and appliances, installation of hydronic heating and cooling systems, installation of natural and liquefied petroleum systems, inspection, maintenance and repairs of plumbing systems and installation of specialized piping systems. In some jurisdictions, other trades perform the installation and maintenance of hydronic heating and cooling systems. Similarly, some jurisdictions have enacted specific legislations requiring additional certification for the installation of natural and liquified petroleum gas systems and private sewage disposal and septic systems.

To perform their job duties effectively and efficiently, plumbers need to know all applicable codes, regulations and laws and of a wide variety of piping systems and plumbing components. Plumbers must have the ability to properly operate hand and power tools and related equipment as well as the ability to determine the appropriate and safest means of performing their tasks. Plumbers also need to possess good mechanical, mathematical and space visualization skills. Because of their interactions with co-workers, clients and other trades people, they also need good interpersonal skills and the ability to effectively communicate in both oral and written forms.

There are certain piping trade skills that are common to plumbers, gas fitters, steamfitters-pipefitters and sprinkler system installers.

OCCUPATIONAL OBSERVATIONS

The plumbing occupation continues to provide a vital service in the Canadian economy. Efficient and effective plumbing systems are a fundamental element of a healthy and environmentally safe society. Plumbers, with their knowledge and skill, are the critical tradespeople who design, install and service the requirements of these systems.

The fundamentals of plumbing remain constant. Plumbers install, maintain and repair piping systems using a core set of skills and knowledge. However, the nature of the plumbing occupation is changing. Advances in the National Plumbing Code are increasingly modifying procedures for the installation of piping systems. These advances are the result of an increased emphasis on worker health and safety, a greater priority attributed to environmental protection, and the necessity for ensuring reliable and efficient distribution systems.

Advances in technology are also having a significant impact on trade procedures. The advent of electronics has resulted in changes to the tools and equipment required in the trade. Increasingly, computer applications are being utilized for system design, layout operation and project management. New techniques are being utilized to install sophisticated systems and fixtures required by the Canadian consumers. Advances in technology are also changing the design, applications and materials of plumbing systems for water supply, drainage, waste and venting, gas fitting and hydronic heating/cooling.

The principles of efficiency and effectiveness continue to dominate piping system design and installation. Increased competition and decreased room for error have resulted in the need for plumbers to increase their skill levels in order to complete the job at increasing levels of perfection. The introduction of high energy conservation fixtures and systems also has increased the required skill and knowledge level of plumbers.

Plumbers' responsibilities are also evolving. Today, there is a trend toward increased trade pride and ethics in all aspects of work from customer service to the training of new apprentices. On the job, plumbers are now expected to recognize and deal safely with a wide variety of hazards. New designs and materials are increasingly requiring plumbers to maintain their focus on a continued commitment to the trade through specialized training and certification.

Finally, as Canadian society evolves to reflect the underlying transformation to the new economy, the plumbing occupation also reacts to reflect those changes in plumbing systems and technology. These major shifts have opened up new opportunities and challenges for plumbers in their efforts to keep current with the new developments in one of the world's oldest trades.

SAFETY

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free working environment.

It is imperative to apply and be familiar with the Workplace Safety and Health Act and the Occupational Health and Safety Act and regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

As safety education is an integral part of training in all jurisdictions, personal safety practices are not recorded in this document. However, the technical safety aspect relating to each task and sub-task are included throughout this analysis.

ANALYSIS

BLOCK A

COMMON OCCUPATIONAL SKILLS

Trends: *Higher demand for computer literacy. Increased demand for demonstrating adaptability and resourcefulness. Increasing participation of women and visible minorities in the trade. More awareness of harassment policies. Increased frequency of estimating, drawing, communicating and material ordering. Greater use of information and communication technologies. The speed of communication has created a need for fast services. Increased demand for a solid foundation in basic skills. Growing opportunities for manufacturers' sponsored training. Improved efficiency due to the use of new tools and new technologies for installation and maintaining of plumbing systems. Difficulty in attracting young people to the trade. Career choice is becoming more polarized because of the unparalleled opportunities available in the "Dot.com" sector.*

Task 1 **Plans work activities.**

Related Components: Contract documents, work schedules, plans and specifications, regulations, National Building Code, plumbing codes and all other applicable codes and standards, technical manuals, work site meetings, laws and regulations on workplace safety and health.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, protective equipment.

Sub-task

1.01 **Interprets drawings and specifications.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

1.01.01 knowledge of all applicable plumbing codes and regulations

1.01.02 knowledge of piping systems

1.01.03 ability to read, analyze and interpret architectural, mechanical, shop, vendor and structural drawings

1.01.04 ability to identify piping systems

1.01.05 ability to identify interference

Supporting Knowledge & Abilities

1.01.06 ability to prepare isometric, sleeving and rough-in sketches

1.01.07 ability to lay out sleeving template

Sub-task

1.02 Prepares list of materials.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

Supporting Knowledge & Abilities

1.02.01 knowledge of various types of plumbing systems, materials, components and parts

1.02.02 knowledge of codes and regulations

1.02.03 ability to determine material requirements

1.02.04 ability to interpret codes and regulations

Sub-task

1.03 Schedules job.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

Supporting Knowledge & Abilities

1.03.01 knowledge of safe work practices

1.03.02 knowledge of applicable codes and regulations

1.03.03 knowledge of job scheduling and work flow

1.03.04 ability to plan work activities to ensure a safe, logical sequence of operations

1.03.05 ability to schedule tools, equipment and material usage

Sub-task

1.04 Prepares job site.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

1.04.01	knowledge of job or site specifications
1.04.02	knowledge of administrative requirements
1.04.03	knowledge of material storage specifics
1.04.04	knowledge of job site safety requirements
1.04.05	ability to apply safety requirements
1.04.06	ability to prepare site offices
1.04.07	ability to store materials
1.04.08	ability to demonstrate positive work ethic

Sub-task

1.05 Provides customer service.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

1.05.01	knowledge of company policies
1.05.02	knowledge of products
1.05.03	ability to communicate with customer to explain problems
1.05.04	ability to diagnose and stabilize situation
1.05.05	ability to present alternative solutions to customer
1.05.06	ability to clean up job site
1.05.07	ability to prepare service report

Task 2 **Uses and maintains hand and portable power tools and equipment.**

Related Components: Manufacturers' operation and maintenance manuals, laws and regulations on workplace and Occupational Safety and Health, National Building Code, company standards,, load charts and manufacturers' charts, hand signals.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

2.01 Uses hand and portable power tools and equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

2.01.01 knowledge of common hand amd portable power tools and equipment and their applications

2.01.02 knowledge of required certification

2.01.03 ability to select appropriate tools

2.01.04 ability to use hand and power ttools safely

2.01.05 ability to select and use rigging and hoisting equipment

2.01.06 ability to make hand signals wlhen hoisting loads

2.01.07 ability to use telephone, cellular phone, fax machine and walkie-talkies

2.01.08 ability to send and receive email

2.01.09 ability to use the computer andl associated software

Sub-task

2.02 Maintains hand and portable power tools and equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

2.02.01 knowledge of common hand and portable power tools and equipment

2.02.02 knowledge of preventive maintenance

2.02.03 knowledge of care and upkeep

2.02.04 ability to perform minor repairs to tools

2.02.05 ability to maintain hosting and rigging equipment

2.02.06 ability to maintain and operate specialty tools and equipment

Task 3 Prepares piping for installation.

Related Components: Pipe joining compound and related consumables, pipe, tubing and fittings related to pipe-joining methods.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

3.01 Cuts pipes.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

3.01.01 knowledge of pipe types, qualities and pressure ratings

3.01.02 knowledge of pipe applications

3.01.03 knowledge of cutting equipment

3.01.04 knowledge of jointing methods

Supporting Knowledge & Abilities

3.01.05 ability to cut pipes according to joining method to be used

Sub-task

3.02 Prepares pipe joints.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

3.02.01 knowledge of threading tools and equipment

3.02.02 knowledge of lubricants

3.02.03 knowledge of grooving tools and equipment

3.02.04 knowledge of welding procedures

3.02.05 knowledge of brazing and soldering procedures

3.02.06 knowledge of flaring equipment

3.02.07 knowledge of compression joints

3.02.08 knowledge of glass piping joint preparation

3.02.09 ability to thread pipe

3.02.10 ability to groove pipe

3.02.11 ability to check groove depth

3.02.12 ability to braze or solder pipes

3.02.13 ability to perform leak test

3.02.14 ability to perform flare connections

3.02.15 ability to perform compression connections

3.02.16 ability to install different types of connections in common use

3.02.17 ability to prepare butt fusion, socket fusion, crimping, solvent weld, press fit, mechanical joints and fusion seals

3.02.18 ability to crimp using various methods

Sub-task

3.03 Bends pipe and tubing. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	NV

3.03.01	knowledge of pipe and tubing bending equipment
3.03.02	knowledge of pipe and tubing characteristics
3.03.03	ability to make templates
3.03.04	ability to bend pipe and tubing
3.03.05	ability to use pipe and tubing bending equipment

Task 4 Installs support systems.

Related Components: Hangers, brackets, supports, plans and specifications, national and local codes, rods, backing, anchors, guides/slide plates, vibration isolation, seismic restraints, structural integrity.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

4.01 Selects systems. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

4.01.01	knowledge of codes and regulations
4.01.02	knowledge of hangers and support systems
4.01.03	ability to select hangers, support systems and materials

Sub-task

4.02 Prepares support systems. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

4.02.01 knowledge of hangers, support systems and materials

4.02.02 ability to prepare hangers and support systems

Sub-task

4.03 Installs support systems. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

4.03.01 knowledge of manufacturers' requirements

4.03.02 knowledge of hanger and support systems

4.03.03 ability to fabricate hangers and supports

4.03.04 ability to install hangers and supports

Task 5 Tests piping, plumbing systems and equipment.

Related Components: Drainage, waste, vents and private sewage disposal systems, water distribution, plumbing fixtures and appliances, hydronic heating/cooling systems, specialized piping systems, pumps.

Tools and Equipment: Hands tools and assorted equipment.

Sub-task

5.01 Determines testing requirements. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.01.01 knowledge of testing procedures, safety precautions and certification requirements

Supporting Knowledge & Abilities

5.01.02 knowledge of applicable codes and regulations

5.01.03 ability to perform equipment start-up procedures

5.01.04 ability to determine type of tests required

Sub-task

5.02 Prepares systems and equipment for testing.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.02.01 knowledge of required tests

5.02.02 knowledge of testing equipment

5.02.03 knowledge of testing procedures

5.02.04 ability to prepare systems and equipment for testing

Sub-task

5.03 Performs required tests.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

5.03.01 knowledge of the dangers involved in testing

5.03.02 knowledge of acceptable pressure testing and electrical control test procedures

5.03.03 ability to test to applicable standards

5.03.04 ability to test drainage, waste, vents and private sewage disposal systems

5.03.05 ability to test specialized piping systems

5.03.06 ability to test crossconnection control

5.03.07 ability to test pumps

Supporting Knowledge & Abilities

5.03.08	ability to test maintenance and repair work when completed
5.03.09	ability to adjust/service systems
5.03.10	ability to flush and disinfect systems
5.03.11	ability to treat water quality
5.03.12	ability to document and interpret test results
5.03.13	ability to produce as-built record of installation
5.03.14	ability to arrange for inspection

Task 6 **Supervises excavation and backfilling of trenches.**

Related Components: Applicable regulations and codes, drainage, waste, vents and private sewage disposal systems, water distribution, plumbing fixtures and appliances, hydronic heating/cooling systems.

Tools and Equipment: Builder's level.

Sub-task

6.01 Arranges for inspection.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

6.01.01	knowledge of applicable codes and regulations
6.01.02	ability to identify appropriate authorities for inspection
6.01.03	ability to determine routes, grade and elevation

Sub-task

6.02 Supervises backfilling of excavations and trenches.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

6.02.01 knowledge of proper backfilling materials and procedures

6.02.02 ability to supervise backfilling

Task 7 Protects piping systems and other plumbing equipment from damage.

Related Components: Environmental protection, physical protection.

Tools and Equipment: Hand tools and assorted equipment.

Sub-task

7.01 Protects piping systems and plumbing equipment from environmental conditions.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

7.01.01 knowledge of frost protection

7.01.02 knowledge of ultraviolet ray protection

7.01.03 knowledge of circulation pumps

7.01.04 knowledge of heat tapes

7.01.05 knowledge of temperature control

7.01.06 knowledge of piping systems and other plumbing equipment

7.01.07 ability to install corrosion protection

7.01.08 ability to protect piping systems and plumbing equipment

Sub-task

7.02 Protects piping systems and plumbing equipment from physical damage.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

7.02.01 knowledge of common practices for protecting piping systems and plumbing equipment

7.02.02 ability to assess needs for protection

Task 8 Installs fire stopping systems.

Related Components: Drainage, waste, vents and private sewage disposal systems, water distribution, plumbing fixtures and appliances, hydronic heating/cooling systems, specialized piping systems, applicable codes and regulations.

Tools and Equipment: Hand tools and assorted equipment.

Sub-task

8.01 Determines fire stopping requirements.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	NV

8.01.01 knowledge of applicable codes and requirements

8.01.02 knowledge of different manufacturers' products

8.01.03 ability to determine need for fire stopping requirements

Sub-task

8.02 Fits fire stopping systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

8.02.01 knowledge of fire stopping systems

8.02.02 ability to determine acceptable application of fire stopping systems

8.02.03 ability to install fire stopping systems according to specifications

Task 9 Acts as mentor to apprentices.

Related Components: Applicable apprenticeship acts and policies, National Building Code, laws and regulations for workplace and Occupational Health and Safety.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

9.01 Provides workplace orientation training.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	NV

9.01.01 knowledge of safety rules and regulations

9.01.02 knowledge of the apprenticeship roles and responsibilities

9.01.03 ability to provide workplace orientation training

9.01.04 ability to provide a positive role model

9.01.05 ability to reinforce work ethic

9.01.06 ability to instill quality of work

Sub-task

9.02 Trains apprentices in plumbing installation.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	yes	yes	yes	yes	yes	no	yes	yes	NV

9.02.01 knowledge of trade theory and practices

9.02.02 knowledge of on-the-job training principles and techniques

9.02.03 ability to provide on-the-job training

BLOCK B

DRAINAGE, WASTE, VENTS AND PRIVATE SEWAGE DISPOSAL SYSTEMS

Trends: *Introduction of better materials, which are easier to install. Increased awareness of environmental contamination. Increased use of plastic pipes. Increased use of biochemical technology for cost-efficiency. Increased use of intumescent technology for cost effectiveness. Increased use of barrier-free applications.*

Task 10 Installs site services.

Related Components: Underground boring, underground piping, excavation, piping systems, surveying, drains, wastes, cleanouts, drainage pipe fittings and vent terminals, access holes, catch basins, shoring cage, shoring barricades, frost protection, sand bed.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protecti equipment, cutting and joining equipment.

Sub-task

10.01 Installs access holes and catch basins.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	NV

10.01.01 knowledge of hoisting and rigging

10.01.02 knowledge of piping connections

10.01.03 ability to install access holes and catch basins

Sub-task

10.02 Installs piping for site services.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

10.02.01 knowledge of DWV (drainage, waste and vent) piping system, pipe types, qualities and pressure ratings

10.02.02 knowledge of pipe joining and installation methods for underground piping

10.02.03 knowledge of piping system layout

10.02.04 knowledge of grade requirements

10.02.05 knowledge of forced sewer mains (lift station)

10.02.06 ability to determine DWV pipe size based on load of vent and drain pipes, using tables and other methods

10.02.07 ability to determine vent and drain sizes

10.02.08 ability to select and install DWV piping system

10.02.09 ability to use building or laser level to determine grade and rim elevation

Task 11 **Installs private sewage systems.**

Related Components: Private sewage disposal systems, septic tanks, holding tanks, effluent disposal system, effluent chamber, siphon, chambers, cesspools, pumps, water contamination, environmental impact, leaching chamber, leaching field.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment.

Sub-task

11.01 Plans installation of private sewage disposal systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	NV

Supporting Knowledge & Abilities

11.01.01	knowledge of private sewage disposal systems
11.01.02	knowledge of interrelated topographical factors, such as property level, size and soil type
11.01.03	knowledge of sewage disposal influences on the environment
11.01.04	knowledge of environmental codes and regulations
11.01.05	ability to obtain approval from governing authority
11.01.06	ability to determine if service location, fixtures and water supply are within plumbing codes and municipal by-laws for private sewage disposal
11.01.07	ability to determine maximum expected load
11.01.08	ability to size septic tank, holding tank and effluent chamber
11.01.09	ability to determine effluent disposal system

Sub-task

11.02 Installs private sewage disposal systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	NV

11.02.01	knowledge of tanks and piping system components and parts
11.02.02	knowledge of disposal fields
11.02.03	knowledge of pumps and specialties
11.02.04	ability to install tank and piping systems
11.02.05	ability to install disposal system
11.02.06	ability to install pumps and specialties
11.02.07	ability to arrange for inspection

Task 12 Prepares rough-in for buried interior drainage, waste and vent systems.

Related Components: Plumbing codes and municipal by-laws, job site specifications, DWV piping systems, vents, vent terminals, drains, cleanouts, waste, syphons, interceptors, underground piping, access holes, catch basins, sand bed, isolation check valves and union.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

12.01 Installs buried piping for drainage, waste and vent systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

12.01.01	knowledge of trench safety
12.01.02	knowledge of DWV piping system design and layout procedures

Supporting Knowledge & Abilities

12.01.03	knowledge of rough-in dimensions for fixtures
12.01.04	knowledge of backwater valve application and installation
12.01.05	ability to determine underground pipe size, grade, material, elevation and routing
12.01.06	ability to lay out and establish grid lines
12.01.07	ability to install union, check and isolation valves for pumped sumps
12.01.08	ability to perform trench work safely

Sub-task

12.02 Installs embedded components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

12.02.01	knowledge of requirements for access points
12.02.02	ability to locate access points
12.02.03	ability to locate and install floor drains, cleanouts, grease and oil interceptors and sediment

Task 13 Installs rough-in for interior drainage, waste and vent systems above grade.

Related Components: DWV piping systems, concealed fixtures, carriers, supports, hangers, structural integrity.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

13.01 Prepares pipe routes for interior drainage, waste and vent systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

13.01.01 knowledge of procedure for determining pipe sizes using hydraulic load calculations and sizing tables

13.01.02 knowledge of DWV above-grade system types, their layout and material selection

13.01.03 knowledge of fire separation principles

13.01.04 ability to use leveling devices

13.01.05 ability to cut or core concrete, wood, masonry and steel

13.01.06 ability to recognize interference with other trades' equipment

13.01.07 ability to select pipe sleeves

13.01.08 ability to install sleeves

Sub-task

13.02 Installs piping for interior drainage, waste and vent systems above ground.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

13.02.01 knowledge of pipe hangers and supports

13.02.02 knowledge of concealed fixture, carrier or support types and their applications

13.02.03 knowledge of DWV piping system installation principles and methods

13.02.04 knowledge of joining and fitting methods

13.02.05 ability to determine DWV pipe size, routing and elevation

Supporting Knowledge & Abilities

13.02.06	ability to install pipe hangers and supports
13.02.07	ability to install concealed fixtures, carriers and supports
13.02.08	ability to install pipes
13.02.09	ability to install pipe sleeves

BLOCK C

WATER SERVICE AND DISTRIBUTION, PLUMBING FIXTURES AND APPLIANCES

Trends: *Increased awareness of water quality. Increased public awareness of need for reducing water consumption. Increased use of energy-efficient equipment and fixtures. Increased use of "home-run" systems over "branch" systems. Increased use of electronic plumbing fixtures. Increased use of space-efficient appliances. Increased use of barrier-free applications.*

Task 14 **Installs water services.**

Related Components: Public and private potable water supply systems, crossconnection/backflow prevention devices, excavation, trenches, frost protection, heat tracing equipment, valves, plans and specifications, applicable codes.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment, excavation and backfill equipment.

Sub-task

14.01 Installs piping and related components for water services.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

14.01.01	knowledge of backflow preventer requirements
14.01.02	ability to determine water pressure, water demand, piping length and size, and material
14.01.03	ability to install piping system to specifications
14.01.04	ability to install frost protection
14.01.05	ability to install thrust block

Sub-task

14.02 Installs water service equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

14.02.01	knowledge of equipment related to water services
14.02.02	ability to install frost protection, thrust blocking, hydrants, valves and other related water service equipment
14.02.03	ability to connect plumbing system to water supply

Task 15 **Installs water distribution systems.**

Related Components: Domestic hot water tanks and related components, potable water testing, fixtures, trim and accessories, special appliances, plans and specifications, building integrity.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

15.01 Prepares routes for water distribution systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

15.01.01 knowledge of building system components

15.01.02 knowledge of water distribution system routes and elevation specifications

15.01.03 ability to coordinate routes and elevations with other building components

15.01.04 ability to install hangers and supports

Sub-task

15.02 Installs piping for potable water distribution systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

15.02.01 knowledge of applicable codes

15.02.02 knowledge of system requirements

15.02.03 ability to determine water pressure, water demand, pipe length and size, and material

15.02.04 ability to install piping

15.02.05 ability to flush piping system

Sub-task

15.03 Installs potable water distribution equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

15.03.01	knowledge of water meter equipment
15.03.02	knowledge of water conditioning equipment
15.03.03	knowledge of pressure system equipment
15.03.04	knowledge of domestic hot water heating equipment
15.03.05	knowledge of crossconnection/backflow prevention devices
15.03.06	knowledge of specialty equipment
15.03.07	ability to install water meter station
15.03.08	ability to install water conditioning devices, water storage and pressurizing systems, water heaters and specialty equipment
15.03.09	ability to install crossconnection/backflow prevention devices

Task 16 Installs water treatment equipment.

Related Components: Potable water distribution code regulations, system and equipment, fixtures and accessories.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

16.01 Tests water quality.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	no	yes	yes	no	yes	yes	NV

16.01.01 knowledge of location of water testing facilities

16.01.02 ability to draw off a sample

Sub-task

16.02 Selects water treatment equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	no	yes	yes	no	yes	yes	NV

16.02.01 knowledge of water quality standard

16.02.02 knowledge of corrective treatment procedures

16.02.03 ability to select appropriate equipment

Sub-task

16.03 Installs water treatment equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

16.03.01 knowledge of installation requirements for water treatment equipment

16.03.02 ability to install water treatment equipment

Task 17 **Installs plumbing fixtures and appliances.**

Related Components: Potable water distribution system and equipment, potable water testing, fixtures, trim accessories, special appliances, plans, specifications and applicable codes.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

17.01 Installs fixture supports. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

17.01.01 knowledge of fixture support types and location

17.01.02 ability to prepare rough-in to accept fixtures

Sub-task

17.02 Installs plumbing fixtures. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

17.02.01 knowledge of plumbing fixtures and installation techniques

17.02.02 ability to install fixtures and trim

17.02.03 ability to connect waste and water systems to fixtures

Sub-task

17.03 Installs specialty plumbing appliances. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

17.03.01 knowledge of specialized appliances types

17.03.02 knowledge of installation techniques

Supporting Knowledge & Abilities

17.03.03	ability to determine special tools and equipment requirements
17.03.04	ability to install specialized appliances and related trim
17.03.05	ability to connect waste and water systems for specialized appliances

BLOCK D

HYDRONIC HEATING/COOLING SYSTEMS

Trends: *More sophisticated controls and systems requiring higher proficiency in electronics and electricity. Increased use of hydronic radiant heating systems. Introduction of better and more cost-effective material that is easier to install. Use of higher-efficiency equipment. Use of alternate fuel sources. Increased use of geothermal systems.*

Task 18 **Installs hydronic heating/cooling piping systems.**

Related Components: Hydronic systems, heating/cooling generating equipment, heating/cooling transfer units, crossconnection/backflow prevention devices, hangers, supports, pipe guides, anchors, expansion joints, hydronic piping, hydronic specialties, National Building Code, all other applicable codes, pumps.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

18.01 Prepares routes for hydronic heating systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV

18.01.01	knowledge of routing requirements
18.01.02	ability to determine proper grading for venting and draining
18.01.03	ability to prepare piping routes

Sub-task

18.02 Installs piping for hydronic heating systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV

18.02.01	knowledge of hydronic piping systems
18.02.02	knowledge of pipe joining and installation methods to allow for expansion
18.02.03	knowledge of proper hoisting practices
18.02.04	ability to install pipes and related devices
18.02.05	ability to chemically clean and flush system
18.02.06	ability to balance system and components

Sub-task

18.03 Prepares routes for hydronic cooling systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	NV

18.03.01	knowledge of routing requirements
18.03.02	ability to determine proper grading for venting and draining

Supporting Knowledge & Abilities

18.03.03 ability to prepare piping routes

Sub-task

18.04 Installs piping for hydronic cooling systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	NV

18.04.01 knowledge of hydronic piping systems

18.04.02 knowledge of pipe joining, expansion and installation methods

18.04.03 knowledge of proper hoisting practices

18.04.04 ability to install pipes and pumps

Task 19 Installs hydronic heating/cooling generating equipment.

Related Components: Hydronic systems, heating/cooling generating equipment, heating/cooling transfer units, crossconnection/backflow prevention devices, hangers, supports, pipe guides, anchors, fuels, energy source type, power supply, hydronic piping, hydronic specialties, pumps, flue piping, combustion air piping.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment.

Sub-task

19.01 Determines location of hydronic heating generating equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV

19.01.01 knowledge of equipment and necessary services

19.01.02 knowledge of access requirements for servicing equipment

Supporting Knowledge & Abilities

19.01.03 ability to determine proper location

Sub-task

19.02 Installs hydronic heating generating equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV

19.02.01 knowledge of hydronic systems

19.02.02 knowledge of initial start-up procedures

19.02.03 ability to determine installation requirements

19.02.04 ability to connect hangers and supports

19.02.05 ability to install hydronic heating generating equipment

19.02.06 ability to connect hydronic piping, flue piping and power supply

19.02.07 ability to perform initial start-up

Sub-task

19.03 Determines location of hydronic cooling generating equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes	NV

19.03.01 knowledge of equipment and necessary services

19.03.02 knowledge of access requirements for servicing equipment

19.03.03 ability to determine proper location

Sub-task

19.04 Installs hydronic cooling generating equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes	NV

19.04.01 knowledge of hydronic systems

19.04.02 ability to determine installation requirements

19.04.03 ability to connect hangers and supports

19.04.04 ability to install hydronic cooling generating equipment

19.04.05 ability to connect hydronic piping and power supply

Task 20 Installs hydronic heating/cooling transfer units.

Related Components: Hydronic systems, heating/cooling equipment, crossconnection/backflow prevention devices, hangers, supports, pipe guides, anchors, generating equipment, hydronic piping, hydronic specialty pumps.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

20.01 Determines location of heating transfer units.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV

20.01.01 knowledge of access and service requirements

20.01.02 ability to determine location of transfer units

Sub-task

20.02 Installs heating transfer units. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV

20.02.01	knowledge of hydronic systems
20.02.02	knowledge of transfer units
20.02.03	ability to install heating transfer units
20.02.04	ability to connect hydronic piping systems

Sub-task

20.03 Determines location of cooling transfer units. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	NV

20.03.01	knowledge of access and service requirements
20.03.02	ability to determine location of transfer units

Sub-task

20.04 Installs cooling transfer units. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	NV

20.04.01	knowledge of hydronic systems
20.04.02	knowledge of transfer units
20.04.03	ability to install cooling transfer units
20.04.04	ability to connect hydronic piping systems

Task 21 **Installs hydronic heating/cooling system controls.**

Related Components: Hydronic systems, heating/cooling equipment, crossconnection/backflow prevention devices, mounting anchors, fuels, generating equipment, hydronic specialties, pumps, codes and regulations.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

21.01 Determines location of heating system controls.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV

21.01.01 knowledge of access and service requirements

21.01.02 knowledge of location for hydronic heating system and auxiliary devices

21.01.03 ability to determine location of control

Sub-task

21.02 Installs heating system controls.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV

21.02.01 knowledge of heating system controls

21.02.02 knowledge of environmental conditions

21.02.03 ability to install heating system controls

21.02.04 ability to protect controls from environmental conditions

21.02.05 ability to test hydronic heating systems and components

21.02.06 ability to maintain hydronic heating systems

21.02.07 ability to repair hydronic heating systems

Sub-task

21.03 Determines location of cooling system controls.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes	NV

21.03.01	knowledge of access and service requirements
21.03.02	knowledge of location for hydronic cooling system and auxiliary devices
21.03.03	ability to determine location of control

Sub-task

21.04 Installs cooling system controls.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes	NV

21.04.01	knowledge of cooling system controls
21.04.02	knowledge of environmental conditions
21.04.03	ability to install cooling system controls
21.04.04	ability to protect controls from environmental conditions
21.04.05	ability to test hydronic cooling systems and components
21.04.06	ability to maintain hydronic cooling systems
21.04.07	ability to repair hydronic cooling systems

BLOCK E

SPECIALIZED PIPING SYSTEMS

Trends: *Increased use of alternate materials. Increased requirement for training and certification due to the introduction of specialty products. Increased requirements for separate certification and license in most jurisdictions.*

Task 22 **Installs natural and liquefied petroleum gas (LPG) systems.**

Related Components: Applicable codes, LPG systems, regulators, pressure relief valves, excavation and back fill trenches, corrosion protection, venting regulators, combustion air and appliance venting system, leak tests, gas meters, manufacturers' instruction manuals, appliances, vaporizers, gas license, gas permit, propane tanks, blanket fire stopping systems.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

22.01 Installs piping for natural gas systems. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	no	no	no	yes	yes	yes	yes	yes	yes	yes	NV

22.01.01 knowledge of heating or cooling unit types and applications

22.01.02 knowledge of applicable codes

22.01.03 knowledge of gas service connection

22.01.04 knowledge of combustion air and appliance venting systems installation

22.01.05 ability to determine longest run, input capacity of gas-burning equipment, manifold and input pressure, materials, pipe size, routing, regulator requirements, combustion air and venting requirements and ensure code compliance

22.01.06 ability to install underground piping systems

22.01.07 ability to install corrosion protection

Supporting Knowledge & Abilities

22.01.08	ability to coordinate with other underground services
22.01.09	ability to install above-ground piping systems
22.01.10	ability to cut and core concrete, wood, masonry and steel
22.01.11	ability to install sleeves, hangers and supports
22.01.12	ability to install piping systems and venting regulators
22.01.13	ability to install combustion air and appliance venting systems
22.01.14	ability to identify piping
22.01.15	ability to test natural gas systems

Sub-task

22.02 Installs piping for LPG systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	NV

22.02.01	knowledge of heating or cooling unit types and applications
22.02.02	knowledge of applicable codes
22.02.03	knowledge of LPG systems and component parts
22.02.04	knowledge of combustion air and appliance venting systems installation
22.02.05	ability to determine longest run, input capacity of gas burning equipment, manifold and input pressure, materials, pipe size, routing, regulator requirements, combustion air and venting requirements and ensure code compliance
22.02.06	ability to install underground piping systems
22.02.07	ability to install corrosion protection

Supporting Knowledge & Abilities

22.02.08	ability to coordinate with other underground services
22.02.09	ability to install above-ground piping systems
22.02.10	ability to cut and core concrete, wood, masonry and steel
22.02.11	ability to install sleeves, hangers and supports
22.02.12	ability to install piping systems and venting regulators
22.02.13	ability to install combustion air and appliance venting systems
22.02.14	ability to identify piping
22.02.15	ability to test liquefied petroleum gas (LPG) systems

Sub-task

22.03 Installs gas equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	no	no	no	yes	yes	yes	yes	yes	yes	yes	NV

22.03.01	knowledge of gas appliances
22.03.02	knowledge of associated electric components
22.03.03	knowledge of applicable codes
22.03.04	knowledge of manufacturers' specifications
22.03.05	ability to install equipment
22.03.06	ability to install electric components
22.03.07	ability to instruct owner on equipment operation
22.03.08	ability to perform equipment start-up procedures

Task 23 **Installs medical gas systems.**

Related Components: Nitrogen tanks and hoses, degreasing equipment, specialized piping, cylinders, regulators, headers, specialized storage facilities, emergency shut-off valves and electronic leak detection, certification.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

23.01 Installs piping for medical gas systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	NV

23.01.01	knowledge of medical gas systems
23.01.02	knowledge of brazing procedure
23.01.03	knowledge of associated electronic equipment
23.01.04	knowledge of certification requirements
23.01.05	ability to perform nitrogen purge
23.01.06	ability to braze
23.01.07	ability to install and support piping
23.01.08	ability to test medical gas piping systems

Sub-task

23.02 Installs equipment for medical gas systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	NV

23.02.01	knowledge of support requirements for medical gas cylinders and cabinets
23.02.02	ability to install equipment to specifications
23.02.03	ability to install outlets, alarms and zone valves

Task 24 **Installs crossconnection control.**

Related Components: Backflow preventers, valves, applicable codes, backflow preventers testing, backflow testing kit, certification.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

24.01 Identifies backflow preventers.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

24.01.01 knowledge of the hazard downstream of assembly

24.01.02 knowledge of backflow preventers

24.01.03 knowledge of operation of backflow preventers

24.01.04 ability to choose proper backflow preventer

Sub-task

24.02 Installs backflow preventers.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

24.02.01 knowledge of support systems

24.02.02 knowledge of proper location

24.02.03 knowledge of installation requirements

24.02.04 ability to install backflow preventers

Task 25 **Installs petroleum systems.**

Related Components: Above-ground storage tanks, below-ground storage tanks, specialized piping, specialized fitting, containment pumps, tanks accessories, oil burners, applicable code, thread sealants.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

25.01 Installs piping for petroleum systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes	NV

25.01.01 knowledge of petroleum products

25.01.02 knowledge of petroleum piping systems

25.01.03 knowledge of containment systems

25.01.04 ability to install piping for petroleum systems

Sub-task

25.02 Installs related equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	no	no	yes	yes	yes	yes	no	yes	yes	NV

25.02.01 knowledge of manufacturers' specifications

25.02.02 ability to install fuel oil equipment

Task 26 **Installs other specialty systems.**

Related Components: Specialty plumbing system components and parts, historic piping, residential fire protection, wet/dry standpipe systems, lawn irrigation systems, wet/dry vacuum systems, acid/hazardous waste systems, pneumatic systems, pools and decorative fountains, marine waste and water systems, chemical treatment systems, agricultural waste and water systems, high purity piping systems and specialty and process piping.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

26.01 Plans installation of specialty piping systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	NV

26.01.01 knowledge of system requirements

26.01.02 ability to install specialty and process piping systems

Sub-task

26.02 Installs specialty piping systems and equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	NV

26.02.01 knowledge of manufacturers' specifications

26.02.02 knowledge of specialized installation methods

26.02.03 ability to install specialty and process piping systems and equipment

BLOCK F

PUMPS

Trends: *Introduction of smaller, multi-speed variable frequency drives and high efficiency pumps. Increased use of small sewage pumps where gravity drainage is impractical. Use of more and smaller pumps rather than one large single pump.*

Task 27 **Selects pumps.**

Related Components: Pump design and specifications, pumps, accessories and components, power requirements, applicable codes, sources of water supply, pressured float switches, safety devices/valves, storage tanks, air injectors, PRVs, level controls and alarms, flow rate meters, ejectors, foot valves, pump vibration isolation.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

27.01 Determines applications.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

27.01.01 knowledge of pump types

27.01.02 knowledge of operating principles

27.01.03 knowledge of system requirements

27.01.04 ability to interpret pump curves and charts

27.01.05 ability to select pump type and size

Sub-task

27.02 Determines accessories. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

27.02.01 knowledge of pump accessories required by applicable codes

27.02.02 knowledge of power source types and applications

27.02.03 ability to select required accessories

Sub-task

27.03 Determines power energy source. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

27.03.01 knowledge of different types of power sources

27.03.02 ability to determine power source

Task 28 Installs pumps.

Related Components: Pump design and specifications, pump accessories, power requirements.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

28.01 Installs piping for pumps. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

28.01.01 knowledge of connection principles and techniques

Supporting Knowledge & Abilities

28.01.02 ability to select and install piping for pump

Sub-task

28.02 Installs pumps and accessories.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

28.02.01 knowledge of pumps, pump accessories, types and applications

28.02.02 ability to install pumps

28.02.03 ability to install accessories

Sub-task

28.03 Coordinates power connection to pump.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

28.03.01 knowledge of power sources

28.03.02 ability to ensure power sources are installed by governing trade

BLOCK G

MAINTENANCE AND REPAIRS

Trends: *Increased demand for scheduled maintenance. Increased demand for diagnostic equipment. Increased demand for broader product knowledge. Increased use of service programs and extended warranties. Increased demand for well-developed customer service skills. Increased customer awareness and expectations.*

Task 29 **Maintains plumbing-related systems and components.**

Related Components: Equipment manuals, manufacturers' operation and maintenance manuals, diagnostic equipment, specialty tools.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

29.01 Plans system maintenance. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

29.01.01 knowledge of preventive maintenance

29.01.02 ability to estimate time required for maintenance

29.01.03 ability to plan maintenance

Sub-task

29.02 Maintains plumbing-related systems. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

29.02.01 knowledge of plumbing-related systems

29.02.02 knowledge of system parts and components

29.02.03 ability to maintain drainage, waste vents and private sewage disposal systems

Supporting Knowledge & Abilities

29.02.04	ability to maintain water service and distribution, and plumbing fixtures and appliances
29.02.05	ability to maintain natural gas systems
29.02.06	ability to maintain liquefied petroleum gas systems
29.02.07	ability to maintain medical gas systems
29.02.08	ability to maintain petroleum systems
29.02.09	ability to maintain other specialty systems
29.02.10	ability to maintain pumps

Task 30 **Repairs plumbing-related systems and components.**

Related Components: Drainage, waste and vent systems, potable water distribution systems, fixtures and appliances, fuel systems, specialty piping systems, pumps, private sewage disposal systems, heating, ventilating and air conditioning (HVAC) control systems.

Tools and Equipment: Hand tools, portable power tools, assorted equipment, hoisting and rigging tools and equipment, protective equipment, cutting and joining equipment.

Sub-task

30.01 **Troubleshoots plumbing-related systems and components.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

30.01.01	knowledge of plumbing systems
30.01.02	knowledge of troubleshooting techniques
30.01.03	ability to assess and analyze "cause and effect"
30.01.04	ability to solve problem
30.01.05	ability to document and report deficiencies

Sub-task

30.02 Repairs plumbing-related systems.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV

30.02.01	knowledge of plumbing-related systems
30.02.02	ability to select parts
30.02.03	ability to correct deficiencies
30.02.04	ability to remove and replace damaged parts and components
30.02.05	ability to repair drainage, waste, vent and private sewage disposal systems
30.02.06	ability to repair water service and distribution, and plumbing fixtures and appliances
30.02.07	ability to repair natural gas systems
30.02.08	ability to repair liquefied petroleum gas systems
30.02.09	ability to repair medical gas systems
30.02.10	ability to repair petroleum systems
30.02.11	ability to repair specialty systems
30.02.12	ability to repair pumps

APPENDICES

TOOLS AND EQUIPMENT

Hand Tools

adjustable wrench
ball-peen hammer
basin wrench
broom
calculator
caliper
caulking gun
chalk line
chisels
claw hammer
combination wrench
compass
copper tube cutter
crimpers
drywall saw
faucet seat wrench
flashlight
hacksaw
hand saw
hand threader
hex keys (set)
hole saw
knife
levels
measuring tape and markers
micrometer
pick
pipe clamp
pipe locator
pipe wrench
plastic tube cutters (set)
pliers (lineman, needle nose, water pump, channel locks)
plumb bob
pry bars
punch
ratchet
ratchet cutter
rubber mallet
scale rule
scratch awl
screwdrivers (complete set)
shovel
sledgehammer
snap cutter
socket set (imperial and metric)
soldering and brazing torch
spud wrench
T square
tap and die sets
tin snips (set)
torque wrench
tri square
tube flaring tools
vice grips

Portable Power Tools

chop saw
circular saw
concrete cutter
power drills
reciprocating saw

Hoisting and Rigging Tools and Equipment

block and tackles
chain block hoist (endless chain)
come-alongs and Tirfors™
rope/cable
shackles of varying sizes
slings and chokers
wire rope or nylon (synthetic)
tuggers (power)

Assorted Equipment

air compressor and accessories
associated software
booster pump
builder's level
cellular phone
circular saw
computer
electrical tools
electronic leak detector
fax machine
hand pump and accessories
heat lamp
hydraulic cutter
hydrostatic pump and gauge
ladder
measuring instruments
oxy-acetylene welding equipment
pumps
steamer
telephone
testing documentation
tracing cable
two way radios
walkie-talkies

Protective Equipment

face shield
fire blanket
fire extinguisher
first aid kit
gloves (industrial, rubber)
hard hat
hearing protection
lock-out
overalls
respiratory mask
safety boots
safety glasses/goggles
safety harness and life line

Cutting and Joining Equipment

assembly tools and equipment
field lathes
file
hand-operated oiler
hot air gun (welder)
pipe cutter
pipe reamer
pipe roller
pipe vise
pipe threader
pipe groover
press-fit
Presto-lite™ gas tanks and soldering equipment
tee drill
tube bender
tube cutter
turbo torch
pipe stand

GLOSSARY

appliance	piece of equipment which may require connection to a plumbing system
back pressure	pressure higher than the supply pressure
back-siphonage	backflow caused by a negative pressure in the supply system
back-siphonage preventer	device or a method that prevents back-siphonage
backflow	flowing back or reversal of the normal direction of the flow
backflow preventer	device or method that prevents backflow
backwater valve	check valve designed for use in a gravity drainage system
branch	soil-or-waste pipe connected at its upstream end to the junction of two or more soil-or-waste pipes or to a soil-or-waste stack, and connected at its downstream end to another branch, a sump, a soil-or-waste stack or a building drain
branch vent	vent pipe that is connected at its lower end to the junction of two or more vent pipes and is connected at its upper end either to a stack vent, vent stack or header, or is terminated in open air
building	any structure used or intended for supporting or sheltering any use or occupancy
building drain	main trunk that other parts of the system connect to
building sewer	pipe that is connected to a building drain 1 m outside a wall of a building and that leads to a public sewer or private sewage disposal system
building trap	trap that is installed in a building drain or building sewer to prevent circulation of air between a drainage system and a public sewer
check valve	valve that permits flow in only one direction
cleanout	access provided in drainage and venting systems to provide for cleaning and inspection services
clear-water waste	waste water with impurity levels that will not be harmful to health and may include cooling water and condensate drainage from refrigeration and air conditioning equipment and cooled condensate from steam heating systems, but does not include storm water

combined building drain	building drain that is intended to conduct sewage and storm water
combined building sewer	building sewer that is intended to conduct sewage and storm water
continuous vent	vent pipe that serves two or more fixtures and is an extension of a wet vent
critical level	level of submergence at which the back-siphonage preventer ceases to prevent back-siphonage
developed length	length along the centre line of the pipe and fitting
directly connected	physically connected in such a way that water or gas cannot escape from the connection
drainage system	assembly of pipes, fittings, fixtures, traps and appurtenances that is used to convey sewage, clear-water waste or storm water to a public sewer or a private sewage disposal system, but does not include subsoil drainage pipes
dual vent	vent pipe that serves two fixtures at the junction of the trap arms
dwelling unit	suite operated as a housekeeping unit used or intended to be used as a domicile by one or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities
fire separation	construction assembly that acts as a barrier against the spread of fire
fixture	receptacle, appliance, apparatus or other device that discharges sewage or clear-water waste, includes a floor drain
fixture drain	pipe that connects a trap serving a fixture to another part of a drainage system
fixture outlet pipe	pipe that connects the waste opening of a fixture to the trap serving the fixture
fixture unit - drainage systems	unit of measure based on the rate of discharge, time of operation and frequency of use of a fixture that expresses the hydraulic load that is imposed by that fixture on the drainage system
fixture unit – water distribution systems	unit of measure based on the rate of supply, time of operation and frequency of use of a fixture or outlet that expresses the hydraulic load that is imposed by that fixture or outlet on the water supply system
flood level rim	top edge at which water can overflow from a fixture or device
flow control roof drain	roof drain that restricts the flow of storm water into the storm drainage system

fresh air inlet	vent pipe that is installed in conjunction with a building trap and terminates outdoors
header	vent pipe that connects two or more vent stacks or stack vents to outdoors
indirectly connected	not directly connected
individual vent	vent pipe that serves one fixture
interceptor	receptacle that is installed to prevent oil, grease, sand or other materials from passing into a drainage system
leader	pipe that is installed to carry storm water from a roof to a storm building drain or sewer or other place of disposal
nominally horizontal	angle of less than 45 degrees with the horizontal
nominally vertical	angle of not more than 45 degrees with the vertical
occupancy	use or intended use of a building or part thereof for the shelter or support of persons, animals or property
offset	piping that connects the ends of two pipes that are parallel
owner	any person, firm or corporation controlling the property under consideration
plumbing contractor	a person, corporation or firm that undertakes to construct, extend, alter, renew or repair any part of a plumbing system
plumbing system	drainage system, a venting system and a water system or parts thereof
potable	safe for human consumption
private sewage disposal system	privately owned plant for the treatment and disposal of sewage (such as a septic tank with an absorption field)
private water supply system	assembly of pipes, fittings, valves, equipment and appurtenances that supplies water from a private source to a water distribution system
relief vent	auxiliary vent which provides additional circulation of air between drainage systems and venting systems
riser	water distribution pipe that extends through at least one full storey
roof drain	fitting or device that is installed in the roof to permit storm water to discharge into a leader

roof gutter	exterior channel installed at the base of a sloped roof to convey storm water
sanitary building drain	building drain that conducts sewage
sanitary building sewer	building sewer that conducts sewage
sanitary drainage system	drainage system that conducts sewage
sanitary sewer	sewer that conducts sewage
service water heater	device for heating water for plumbing services
sewage	any liquid water other than clear-water waste or storm water
soil-or-waste pipe	pipe in a sanitary drainage system
soil-or-waste stack	a vertical soil-or-waste pipe that passes through one or more storeys, and includes any offset that is part of the stack
stack vent	vent pipe that connects the top of a soil-or-waste stack to a header or to open air
storey - plumbing	interval between two successive floor levels
storm building drain	building drain that conveys storm water
storm building sewer	building sewer that conveys storm water
storm drainage system	drainage system that conveys storm water
storm sewer	sewer that conveys storm water
storm water	water that is discharged from a surface as a result of rainfall or snowfall
subdrainage system	drainage system that does not drain by gravity to the building sewer
subsoil drainage pipe	pipe that is installed underground to intercept and convey subsurface water
suite	single room or series of rooms of complementary use, operated under a single tenancy and includes dwelling units, individual guest rooms in motels, hotels, boarding houses, rooming houses and dormitories as well as individual stores and individual or complementary rooms for business and personal services occupancies
trap	fitting or device that is designed to hold a liquid seal that will prevent the passage of gas but will not materially affect the flow of a liquid

trap arm	that portion of a fixture drain between the trap weir and the vent pipe fitting
trap standard	trap for a fixture that is integral with the support for the fixture
vent pipe	pipe that is part of a venting system
vent stack	vent pipe that is connected at its upper end to a header or is terminated in open air and that is used to limit pressure differential in a soil-or-waste stack
venting system	assembly of pipes and fittings that connects a drainage system with outside air for circulation of air and the protection of trap seals in the drainage system
water distribution system	assembly of pipes, fittings, valves and appurtenances that conveys water from the water service pipe or private water supply system to water supply outlets, fixtures, appliances and devices
water service pipe	pipe that conveys water from a public water main or private water source to the inside of a building
water system	private water supply system, a water service pipe, a water distribution system or parts thereof
wet vent	soil-or-waste pipe that also serves as a vent pipe

BLOCKS AND TASKS WEIGHTING

BLOCK A COMMON OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	National Average
%	10	10	5	13	10	20	15	15	16	10	17	5	NV	12%

Task 1 Plans work activities.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	13	7	20	10	15	10	5	20	14	10	17	10	NV	13%

Task 2 Uses and maintains hand and portable power tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	15	20	10	19	5	20	10	20	11	25	5	10	NV	14%

Task 3 Prepares piping for installation.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	17	17	10	19	15	25	30	20	17	30	23	15	NV	20%

Task 4 Installs support systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	19	20	10	12	10	15	15	13	14	15	17	15	NV	15%

Task 5 Tests piping, plumbing systems and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	9	10	5	13	25	10	5	13	12	15	10	20	NV	12%

Task 6 Supervises excavation and backfilling of trenches.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	5	5	5	9	5	3	10	0	9	0	3	10	NV	5%

Task 7 Protects piping systems and other plumbing equipment from damage.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	7	8	5	10	10	10	10	7	8	5	5	10	NV	8%

Task 8 Installs fire stopping systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	9	10	5	8	10	3	5	7	6	0	10	10	NV	7%

Task 9 Acts as mentor to apprentices.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	6	3	30	0	5	4	10	0	9	0	10	0	NV	6%

BLOCK B DRAINAGE, WASTE, VENTS AND PRIVATE SEWAGE DISPOSAL SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	National Average
%	30	35	37	27	35	20	20	25	22	30	22	30	NV	28%

Task 10 Installs site services.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	15	20	10	20	25	5	10	16	19	5	10	20	NV	15%

Task 11 Installs private sewage systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	15	10	10	0	5	10	20	16	17	5	5	20	NV	11%

Task 12 Prepares rough-in for buried interior drainage, waste and vent systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	24	25	40	37	35	40	35	24	31	10	35	30	NV	30%

Task 13 Installs rough-in for interior drainage, waste and vent systems above grade.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	46	45	40	43	35	45	35	44	33	80	50	30	NV	44%

BLOCK C **WATER SERVICE AND DISTRIBUTION, PLUMBING FIXTURES AND APPLIANCES**

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	National Average
%	20	25	19	25	35	20	20	15	20	20	22	25	NV	22%

Task 14 Installs water services.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	24	20	10	26	30	10	10	13	24	10	15	20	NV	18%

Task 15 Installs water distribution systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	41	40	40	31	30	45	55	27	30	50	40	30	NV	38%

Task 16 Installs water treatment equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	12	10	10	14	10	15	15	27	12	0	10	20	NV	13%

Task 17 Installs plumbing fixtures and appliances.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	23	30	40	29	30	30	20	33	34	40	35	30	NV	31%

BLOCK D **HYDRONIC HEATING/COOLING SYSTEMS**

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	National Average
%	19	15	18	7	0	10	5	15	16	10	13	25	NV	13%

Task 18 Installs hydronic heating/cooling piping systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	36	35	30	41	0	35	25	32	50	20	55	30	NV	32%

Task 19 Installs hydronic heating/cooling generating equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	21	30	30	27	0	30	25	30	20	30	15	30	NV	24%

Task 20 Installs hydronic heating/cooling transfer units.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	24	30	30	20	0	20	25	18	20	20	20	30	NV	21%

Task 21 Installs hydronic heating/cooling system controls.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	19	5	10	12	0	15	25	20	10	30	10	10	NV	14%

BLOCK E SPECIALIZED PIPING SYSTEMS.

	NS	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	National Average
%	5	5	5	7	5	15	20	12	9	20	13	5	NV	10%

Task 22 Installs natural and liquefied petroleum gas (LPG) systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	24	40	30	0	0	15	25	42	28	80	60	60	NV	34%

Task 23 Installs medical gas systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	18	15	30	0	25	15	25	17	16	2	10	10	NV	15%

Task 24 Installs crossconnection control.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	32	18	15	60	15	25	30	17	20	18	10	10	NV	23%

Task 25 Installs petroleum systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	9	5	15	0	0	10	10	8	12	0	10	10	NV	7%

Task 26 Installs other specialty systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	17	22	10	40	60	35	10	16	24	0	10	10	NV	21%

BLOCK F PUMPS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	National Average
%	9	3	10	7	5	5	10	6	6	5	4	5	NV	6%

Task 27 Selects pumps.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	42	30	50	39	35	50	20	50	50	40	50	65	NV	43%

Task 28 Installs pumps.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	58	70	50	61	65	50	80	50	50	60	50	35	NV	57%

BLOCK G MAINTENANCE AND REPAIRS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	National Average
%	7	7	6	14	10	10	10	12	11	5	9	5	NV	9%

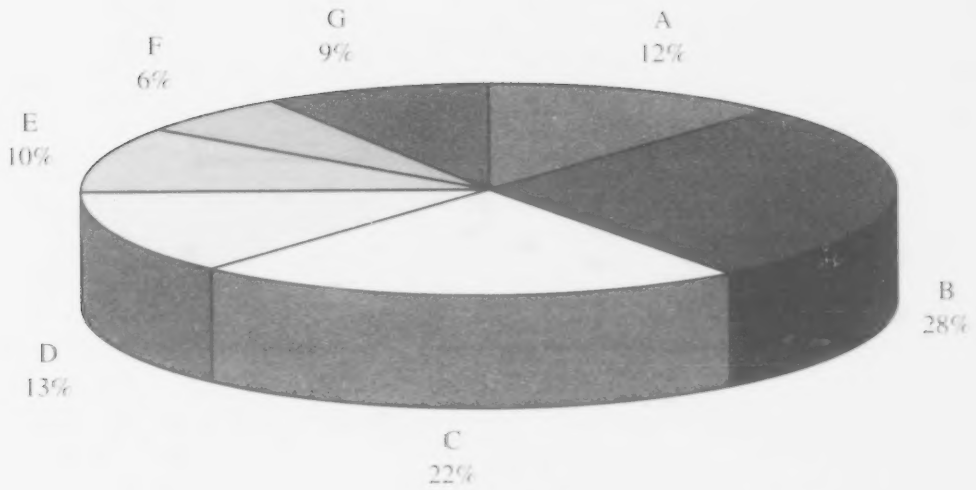
Task 29 Maintains plumbing-related systems and components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	40	30	40	50	35	35	50	50	50	25	50	50	NV	42%

Task 30 Repairs plumbing-related systems and components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YK	NU	
%	60	70	60	50	65	65	50	50	50	75	50	50	NV	58%

PIE CHART*
Plumber



TITLES OF BLOCKS

Block A	Common Occupational Skills	Block E	Specialized Piping Systems
Block B	Drainage, Waste, Vents and Private Sewage Disposal Systems	Block F	Pumps
Block C	Water Service and Distribution, Plumbing Fixtures and Appliances	Block G	Maintenance and Repairs
Block D	Hydronic Heating/Cooling Systems		

* The average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input of workers within the occupation from all areas of Canada. Interprovincial examinations typically have from one hundred to one hundred and fifty multiple-choice questions on each examination.

BLOCKS	TASKS	SUB-TASKS				
A **Common Occupational Skills**	**1.** Plans work activities.	1.01 Interprets drawings and specifications.	1.02 Prepares list of materials.	1.03 Schedules job.	1.04 Prepares job site.	1.05
	2. Uses and maintains hand and portable power tools and equipment.	2.01 Uses hand and portable power tools and equipment.	2.02 Maintains hand and portable power tools and equipment.			
	3. Prepares piping for installation.	3.01 Cuts pipes.	3.02 Prepares pipe joints.	3.03 Bends pipes and tubing.		
	4. Installs support systems.	4.01 Selects systems.	4.02 Prepares support systems.	4.03 Installs support systems.		
	5. Tests piping, plumbing systems and equipment.	5.01 Determines testing requirements.	5.02 Prepares systems and equipment for testing.	5.03 Performs required tests.		
	6. Supervises excavation and backfilling of trenches.	6.01 Arranges for inspection.	6.02 Supervises backfilling of excavations and trenches.			
	7. Protects piping systems and other plumbing equipment from damage.	7.01 Protects piping systems and plumbing equipment from environmental conditions.	7.02 Protects piping systems and plumbing equipment from physical damage.			
	8. Installs fire stopping systems.	8.01 Determines fire stopping requirements.	8.02 Fits fire stopping systems.			
	9. Acts as mentor to apprentices.	9.01 Provides workplace orientation training.	9.02 Trains apprentices in plumbing installation.			

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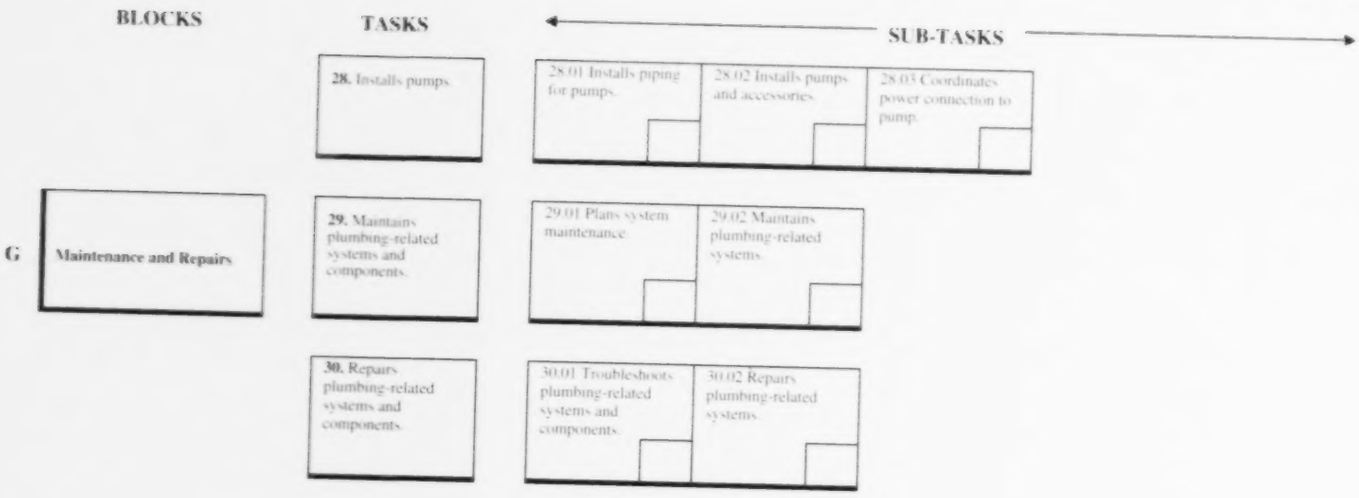
APPENDIX "E"

BLOCKS	TASKS	SUB-TASKS			
B **Drainage, Waste, Vents and Private Sewage Disposal Systems**	**10.** Installs site services.	10.01 Installs access holes and catch basins.	10.02 Installs piping for site services.		
	11. Installs private sewage systems.	11.01 Plans installation of private sewage disposal systems.	11.02 Installs private sewage disposal systems.		
	12. Prepares rough-in for buried interior drainage, waste and vent systems.	12.01 Installs buried piping for drainage, waste and vent systems.	12.02 Installs embedded components.		
	13. Installs rough-in for interior drainage, waste and vent systems above grade.	13.01 Prepares pipe routes for interior drainage, waste and vent systems.	13.02 Installs piping for interior drainage, waste and vent systems above ground.		
C **Water Service and Distribution, Plumbing Fixtures and Appliances**	**14.** Installs water services.	14.01 Installs piping and related components for water services.	14.02 Installs water service equipment.		
	15. Installs water distribution systems.	15.01 Prepares routes for water distribution systems.	15.02 Installs piping for potable water distribution systems.	15.03 Installs potable water distribution equipment.	
	16. Installs water treatment equipment.	16.01 Tests water quality.	16.02 Selects water treatment equipment.	16.03 Installs water treatment equipment.	
	17. Installs plumbing fixtures and appliances.	17.01 Installs fixture supports.	17.02 Installs plumbing fixtures.	17.03 Installs specialty plumbing appliances.	
D **Hydronic Heating/Cooling Systems**	**18.** Installs hydronic heating/cooling piping systems.	18.01 Prepares routes for hydronic heating systems.	18.02 Installs piping for hydronic heating systems.	18.03 Prepares routes for hydronic cooling systems.	18.04 Installs piping for hydronic cooling systems.

BLOCKS	TASKS	SUB-TASKS			
	19. Installs hydronic heating/cooling generating equipment.	19.01 Determines location of hydronic heating generating equipment.	19.02 Installs hydronic heating generating equipment.	19.03 Determines location of hydronic cooling generating equipment.	19.04 Installs hydronic cooling generating equipment.
	20. Installs hydronic heating/cooling transfer units.	20.01 Determines location of heating transfer units.	20.02 Installs heating transfer units.	20.03 Determines location of cooling transfer units.	20.04 Installs cooling transfer units.
	21. Installs hydronic heating/cooling system controls.	21.01 Determines location of heating system controls.	21.02 Installs heating system controls.	21.03 Determines location of cooling system controls.	21.04 Installs cooling system controls.
E **Specialized Piping Systems**	**22.** Installs natural and liquefied petroleum gas (LPG) systems.	22.01 Installs piping for natural gas systems.	22.02 Installs piping for LPG systems.	22.03 Installs gas equipment.	
	23. Installs medical gas systems.	23.01 Installs piping for medical gas systems.	23.02 Installs equipment for medical gas systems.		
	24. Installs cross connection control.	24.01 Identifies backflow preventers.	24.02 Installs backflow preventers.		
	25. Installs petroleum systems.	25.01 Installs piping for petroleum systems.	25.02 Installs related equipment.		
	26. Installs other specialty systems.	26.01 Plans installation of specialty piping systems.	26.02 Installs specialty piping systems and equipment.		
F **Pumps**	**27.** Selects pumps.	27.01 Determines applications.	27.02 Determines accessories.	27.03 Determines power energy source.	

-TASKS →

Determines n of hydronic generating ent.	19.04 Installs hydronic cooling generating equipment.
Determines n of cooling r units.	20.04 Installs cooling transfer units.
Determines n of cooling controls.	21.04 Installs cooling system controls.
nstalls gas ent.	
Determines energy source.	


BLOCKS
TASKS
SUB-TASKS
28. Installs pumps.
28.01 Installs piping for pumps.
28.02 Installs pumps and accessories.
28.03 Coordinates power connection to pump.
G
Maintenance and Repairs
29. Maintains plumbing-related systems and components.
29.01 Plans system maintenance.
29.02 Maintains plumbing-related systems.
30. Repairs plumbing-related systems and components.
30.01 Troubleshoots plumbing-related systems and components.
30.02 Repairs plumbing-related systems.